Concept Development and Warfare Analysis

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LONG TERM GOAL

Support Coastal Systems Station, Panama City, FL in developing fleet accepted, visionary, amphibious and mine warfare operational concepts for the 2010 and beyond time frame and in conducting warfare analysis as part of the surf zone technology concept assessment program.

OBJECTIVE

To provide a relevant, concept-based operational assessment of emerging exploratory development concepts (6.2 and 6.3 core programs) for obstacle and mine breaching and clearance in the surf zone and on the beach. Logicon Syscon facilitates and provides "warfighter" involvement in defining concept operational preferences and limitations, criteria for determining the optimum investment strategy in the technology concept selection process.

APPROACH

Concept development and warfare analysis involves a structured, repeatable process centered on operational concepts, mission profiles, and operational analysis. Operational concepts are developed to provide concept-based mine warfare requirements/implications to focus and guide science and technology long-term goals and investments. Potential requirements/implications provided by operational concepts are reduced time, miniaturization, multi-threat capable, autonomous standoff delivery, improved surveillance and reconnaissance capabilities, in-stride and large area obstacle and mine neutralization and clearance capabilities, and organic mine reconnaissance and clearance capabilities for forward deployed forces. Warfare analysis is one input into the advanced concept assessment process for determining the optimum investment strategy. That is, which concepts should be developed to meet mine and obstacle breaching requirements. It quantifies, through a forward-looking assessment, the operational utility of exploratory development concepts, one of seven selection criteria considered in the concept assessment process.

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Warfare analysis is an overarching process under which mission profiles are developed and operational analysis is conducted. Mission profiles, based on a structured analytical process, are developed within the framework of the "Integrated Amphibious and Mine Warfare Operational Concept for the Year 2010" and describe the tactical employment of exploratory development concepts breaching mines and obstacles on the beach and in the surf zone under varying operational and environmental conditions. They address the mine and obstacle threat, command and control organization, logistics requirements, doctrine and tactics, lift requirements, the integration with other warfare disciplines, and any impact these areas present to the tactical employment of a single concept or the integrated employment of multiple concepts. A mission profile depicts a specific real-world geographic area located within the defense planning guidance (DPG) major regional contingency (MRC) WEST and EAST regions. One output of a mission profile is integrated employment data that is used to analyze the operational utility of a concept. In developing mission profiles, extensive liaison with operational commands within the Navy and Marine Corps is conducted. This liaison provides the intended users, the Navy and Marine Corps, with an operational input to the exploratory development process and, along with this "warfighter" input, the quantitative data developed from the mission profile provides measures of effectiveness, conclusions, and recommendations to the acquisition community that ultimately shape the design criterion for each concept.

Operational analysis is conducted using the integrated data developed in the mission profile process to make objective evaluations and the extensive operational experience of the Logicon Syscon team to make subjective evaluations to select the operationally preferred concept from a group of similar concepts. An operational analysis is conducted using decision support software to provide structure to the analysis process and operational experience to validate the final results. The final results are in fact influenced by the Navy and Marine Corps "warfighter" involvement provided and facilitated by Logicon Syscon. To evaluate the operational effectiveness of exploratory development concepts, measures of effectiveness (MOEs) are used in a hierarchical structure developed to organize the decision making process (see Figure 1). The MOEs have been weighted to place the proper emphasis within each area. The MOEs and weighted priorities are:

Time (.201): is the total time required for the integrated employment of the concepts to achieve 90% area coverage within two lanes in the surf zone and on the beach in the mission profile.

Lift (.178): considers the storage requirements (square and cube) within the naval expeditionary force (NEF), the quantity of the specific concept required determined from modeling, and the complexity of movement and staging.

Availability (.110): addresses the ability to obtain delivery platforms (F/A-18E/F, LCAC, C-130, and CH-53E: available from within or out of the NEF and the quantity of delivery platforms required.

Command and Control (.250): addresses the number of events in the integrated concept of operations (compatibility and sequencing with other concepts), the ability to electronically map area coverage, the operational flexibility to reprogram mission parameters, and interoperability with other warfare areas.

Vulnerability (.111): addresses the susceptibility of the delivery platform and concept to jamming, missiles, and gunfire. Also takes into account the safety of personnel in the delivery platform.

Operational complexity (.150): addresses how effectively the operational concept is supported by the concept, the ability of a single concept to breach multiple threats, collateral effects and damage at the landing point, and adverse environmental effects.

The selection of the operationally preferred concept is arrived at by "synthesizing" the hierarchical structure created in the decision support software using the "ideal" mode. Synthesis is the process of weighing and combining priorities throughout the hierarchy structure. Synthesis starts at the goal, i.e., select the operationally preferred concept, and multiplies the weight of each MOE against the numerical preference, a value of ±1-9, assigned to a pair of concepts. A sensitivity analysis is conducted using the decision support software to determine how changes in MOE weight may affect the selection of the operationally preferred concept.
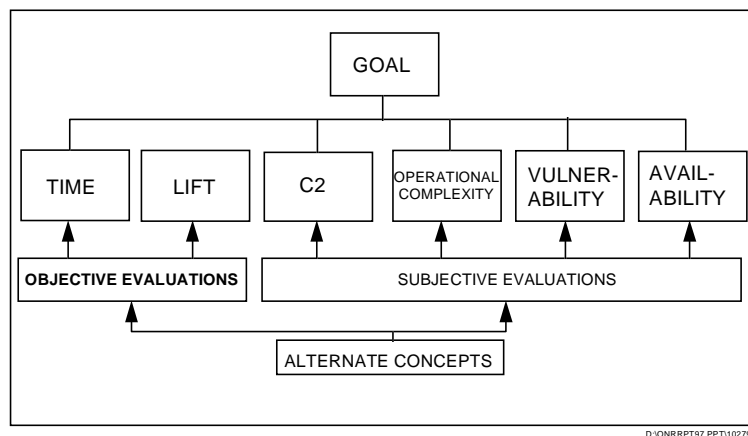

Figure 1. Operational Analysis Hierarchical Structure

WORK COMPLETED

The following exploratory development concepts have been analyzed:

FY95-96: Explosively Formed Projectile Cluster Bomb (EFP CB), Continuous Rod Warhead (CRW), Linear Shaped Charge Surf Zone and Beach Zone arrays (LSC SZ/BZ), Magic Carpet Surf Zone and Beach Zone arrays (MC SZ/BZ), Thunder Road surf zone array, Flying Sword, Thunder Road Longshot, Thunder Road mortar, location reporting system, Rapid Airborne Mine Clearance System (RAMICS), and Lemmings.

FY97: Foam bridging.

FY97-98: Stand-off delivery concepts (Longshot™, Deployable Wing, Navy Multiple Launch Rocket System (NMLRS), Extended Range Guided Munitions Obstacle Breaching Variants (ERGM-OBV).

RESULTS

Using the warfare analysis process shown in Figure 2, the selection of operationally preferred concepts by Logicon Syscon with Coastal Systems Station's concurrence has produced the following FY98 baseline of exploratory development concepts for obstacle and mine breaching:

AREA	CONCEPT
Beach Obstacles	Longshot™ 500/2000
Beach Mines	Magic Carpet Beach Zone Array
Surf Zone Obstacles	Linear Shape Charge Surf Zone Array
Surf Zone Mines	Magic Carpet Surf Zone Array (C-130)
Miscellaneous	Location Reporting System
	RAMICS

IMPACT/APPLICATIONS

Assessing the operational preference of emerging exploratory development concepts in a "fleet" approved conceptual operational framework enables the science and technology community to leverage technological opportunities to meet relevant mission requirements in a cost effective, focused manner. Multiple programs to counter a single threat or programs that lack the proper interfaces with the "user" are simply not cost effective in today's austere Defense Department budget climate.
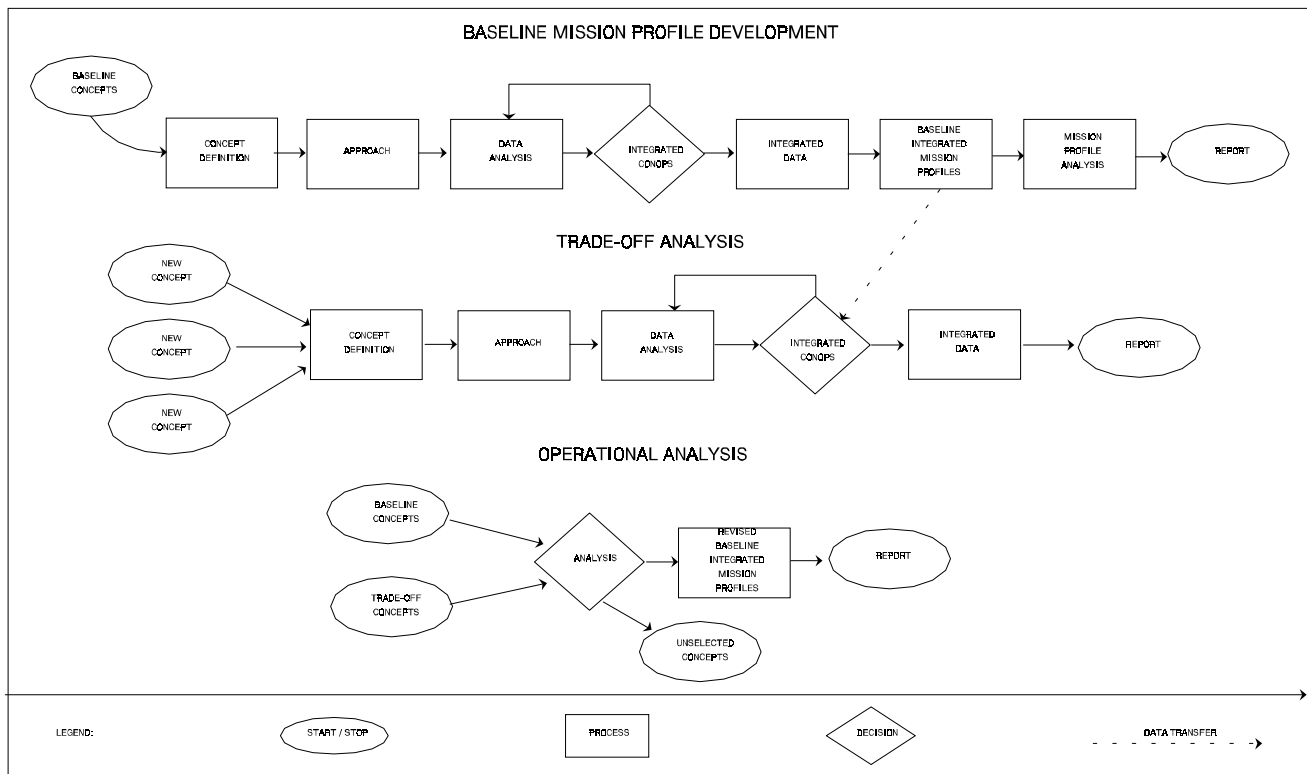

Figure 2. Warfare Analysis Process Flow Chart

TRANSITIONS/RELATED PROJECTS

Logicon Syscon performs similar mission profiles and operational analysis for the Assault Breaching System (ABS) and Explosive Neutralization Pre-Planned Product Improvement (ENP^{3}I) programs.

REFERENCES

CSS Technical Report, "Integrated Amphibious and Mine Warfare Operational Concept for the Year 2010," Revision 1, dated 15 August 1996

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"Beyond 2010 Mine Countermeasures Operational Concepts," draft briefing dated April 1997

Operational Feasibility Analysis, "Using Foam to Bridge Mines and Obstacles in the Surf Zone During an Amphibious Assault," dated 13 June 1997

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